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### The use of empirical methods in merger investigations

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#### *Introduction*

Empirical techniques are widely used for merger evaluation in the U.S., the E.U. and other jurisdictions. These techniques range from relatively simple analysis of market concentration through to complex econometric data analysis and sophisticated computer simulation modelling.

The extensive use of empirical techniques for merger analysis reflects the close relationship between the legal questions raised in merger evaluation and the type of issues that can be considered by empirical analysis. Thus, in the U.S. context, Werden notes that:

*“[s]ection 7 of the Clayton Act and the case law applying it provide a clear rationale for the use of econometrics. Section 7 asks not whether there is likely to be any lessening of competition, but rather whether there is likely to be a substantial lessening of competition. And in delineating markets, the case law asks not whether products are substitutes at all, but rather whether they are good substitutes. Judgements on these critical matters of degree often can be informed by econometrics, perhaps even uniquely so”.*<sup>1</sup>

Similar issues lie at the heart of merger evaluation in Australia. However, there has been a perceived reluctance by some parties in Australia to utilise empirical analysis when considering mergers. For example, “[i]n Australia ... courts have demonstrated a lack of willingness to engage with detailed and often complex economic evidence”.<sup>2</sup> As a result, submissions to the Australian Competition and Consumer Commission (ACCC) regarding proposed mergers often contain little if any empirical market analysis. Indeed, some submissions even fail to provide market share information, despite the extensive discussion of market concentration in the ACCC merger guidelines.<sup>3</sup>

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<sup>1</sup> G. Werden (2002) “A perspective on the use of econometrics in merger investigations and litigation”, *Antitrust*, 55-58 at 55, emphasis in original.

<sup>2</sup> A. Merrett (2005) “Quantitative analysis again up in lights”, *TPLJ*, 13, 90-97 at 90. At least in merger matters, this criticism appears misplaced. In *Australian Gas Light Company v Australian Competition & Consumer Commission* [2003] FCA 1525, 19 December the Court showed a willingness and an ability to deal with complex empirical analysis including simple price comparisons and correlation analysis for geographic market definition (at paragraph 386) and residual demand analysis to determine competitive effects (at paragraphs 494 to 569).

<sup>3</sup> Australian Competition and Consumer Commission (1999) *Merger Guidelines*, Canberra, June.

Empirical analysis is one of a number of useful inputs for merger analysis. It is a necessary input, in the sense that little if any sensible competition analysis can be brought to bear on merger evaluation in the absence of at least some quantitative information.

At the same time, empirical analysis is not a sufficient input for merger evaluation. Empirical analysis needs to be compared and contrasted with qualitative information gathered through market inquiries. Commercial reality must temper any conclusions drawn from empirical analysis. For example, while empirical analysis might suggest that substitution possibilities exist between two products, if the market evidence shows that these substitution possibilities are unlikely to eventuate then it is reasonable to conclude that these possibilities do not commercially exist. If what appear to be profitable substitution possibilities have not been pursued over the longer term, then it is likely that these possibilities are not real, despite any empirical analysis to the contrary. Thus, qualitative and quantitative analyses are complementary parts of merger evaluation.

Even relatively simple quantitative techniques, such as trade-flow analysis or market concentration analysis, can shed significant light on the competitive effects of a merger. The usefulness of empirical analysis for merger evaluation, however, is directly linked both to the quality of the work and the communication of that work to the relevant authorities. If work is poor quality then clearly little weight can be placed on its conclusions. But just as important, if empirical analysis is poorly presented then the relevant decision makers evaluating a merger will not be able to give the analysis significant weight. For example, if it is not clear what data has been used, the robustness of the results or the exact nature of the tests employed, the decision makers cannot have significant regard to the empirical analysis.

This paper provides background and guidance for the use of empirical analysis for merger evaluations under Australia's *Trade Practices Act 1974*. It begins by briefly (and non-exhaustively) discussing the range of empirical techniques that have been used for merger evaluation in Australia and other jurisdictions. Then, the paper considers standards that have been proposed for good empirical analysis and the reasons for these standards. Finally, the paper presents some guidelines for the preparation and communication of empirical analysis for merger evaluation in Australia.

### ***Types of empirical analysis***

Empirical analysis refers to the use and evaluation of numerical data. It is also referred to as quantitative analysis and includes, but is not limited to, econometric analysis.

Broadly speaking, there are two different sources of data for empirical merger analysis: data relating to prices, market shares, production capacities, geographic flows of products and other market parameters that are revealed by past market behaviour; and data derived from surveys or controlled experiments, such as numerical information collected by asking questions to relevant market participants

such as customers or suppliers, that is created for the specific purpose of the merger investigation.<sup>4</sup>

There are a wide range of empirical analyses that can be brought to bear on merger evaluation. These analyses differ according to the exact data they require, the matters where they can provide insight, the sensitivity of their results and the complexity of their underlying procedures. As the International Competition Network notes “[u]seful quantitative evidence does not always involve complex statistical or economic analysis. It may involve something as simple as sorting customer databases by customer size, location of customer, or types of product sold, by customers, to reveal important customer characteristics”.<sup>5</sup>

It is important to recognise that there is no one ‘correct’ approach to empirical analysis of a merger. Rather, merger analysis must be carefully chosen to fit the circumstances and different empirical tests will be appropriate depending on the exact facts surrounding each merger. The investigation of a single merger might be enlightened by a variety of different empirical analyses, where each analysis provides insight into a different aspect of the acquisition.

In some situations different analyses will provide different and conflicting results. This does not mean that the analyses are necessarily wrong but rather that they rely on different assumptions or use different data sets and/or statistical techniques. It is important that the authorities understand the assumptions underpinning the analysis, and the data and statistical methods used in order to evaluate the different analyses and to place due weight on those analyses.

It is also important to recognise that empirical analysis by itself is never definitive in merger evaluation. Even the most carefully crafted empirical study relies on specific assumptions and faces limitations on the data and statistical methodology used. At a bare minimum, any empirical analysis must be checked against qualitative market evidence. Where qualitative and quantitative evidence are in conflict, the source of that conflict needs to be discerned and the authorities need to place appropriate weight on the different types of evidence.

Empirical analysis of mergers focuses on market definition and competitive effects. Market definition tools include price correlations, trade-flow analysis and various tests of substitution. Tests of competitive effects tend to focus on concentration and whether or not the merging parties will find it profitable to maintain a price rise after the acquisition is completed. Merger simulation models are also used to try and capture the competitive effects of an acquisition.

The simplest empirical tool for market definition is a direct consideration of prices. Under this approach, two products are more likely to be substitutes, and hence in the same market, if they sell for similar prices. Thus two compact cars that sell for similar prices might be considered to be in the same market but a family car that is fifty

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<sup>4</sup> The collection of survey data and the design of market experiments are specialised fields of expertise that will not be discussed in this paper.

<sup>5</sup> International Competition Network (2005) *ICN investigative techniques handbook for merger review*, [www.internationalcompetitionnetwork.org](http://www.internationalcompetitionnetwork.org), June at 50.

percent more expensive might not be in the same market. A compact car purchaser is more likely to switch their demand to the other equivalently priced car than to the more expensive family car.

A direct price comparison is simple and quick, but it is also fraught with danger. For example, a 2 litre container of fresh milk might sell at almost twice the price of a 1 litre container, but this does not mean that the products are in different markets. More generally, what price difference distinguishes products that are in the same market from those in different markets? How does the analyst account for quality differentials between products? What if units make the price comparison meaningless so that comparing the price of a grape with the price of a grapefruit provides no useful information about the existence or otherwise of a fresh fruit market? Is there any evidence of actual customer switching to back up the price-based distinction?

In response to these issues, more sophisticated price comparison tools have developed. Rather than looking at price levels, it is possible to consider how prices of different products move over time. Lexecon explains the price correlation test:

*The intuition behind price correlation analysis is that there is a limit to how far prices of products within the same relevant market can diverge before either demand-side or supply-side substitution forces them back into line. As a result we would expect to see the prices of products in the same market to move together over time. Similarly, if two regions are in the same geographic market, prices of a given product in both regions should follow a similar pattern over time.*<sup>6</sup>

Care must be taken with price correlation analysis to avoid spurious causation, for example, where prices are positively correlated simply due to the effects of economy-wide inflation or as a result of the change in the price of a common input. Smith presents a useful summary of the limitations of this approach as well as its use in Australian courts.<sup>7</sup>

Issues of spurious correlation can be avoided using stationarity analysis. This technique considers whether or not the ratio of the prices of two separate products tends to return to a particular level over time. If it does, then this suggests that the two products might be in the same market. “Since the relative price is just the ratio of the prices of the two products, it is not affected by similar changes in the price levels of the two products, as these simply cancel each other out”.<sup>8</sup>

Market definition considers the degree of substitutability between different products both on the demand-side and the supply-side. As the Australian High Court noted in *Queensland Wire Industries v BHP*:

*A market is the area of close competition between firms or, putting it a little differently, the field of rivalry between them ... Within the*

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<sup>6</sup> Lexecon (2003) *An introduction to quantitative techniques in competition analysis*, London, November at 5. See also . Carlton and J. Perloff (1994) *Modern Industrial Organization* (2<sup>nd</sup> ed), Harper Collins, New York at p.806.

<sup>7</sup> R. Smith “The practical problem of market definition revisited” *Australian Business Law Review* 1995, 23, pp. 52-60.

<sup>8</sup> Lexecon op. cit. note 6 at 10.

*bounds of a market there is substitution – substitution between one product and another, and between one source of supply and another, in response to changing prices. So a market is the field of actual and potential transactions between buyers and sellers amongst whom there can be strong substitution, at least in the long run, if given a sufficient price incentive.*<sup>9</sup>

Substitution between different products is measured by the cross price elasticity of demand. This is “a measure of how much the quantity demanded of one good responds to a change in the price of another good, computed as the percentage change in quantity demand of the first good divided by the percentage change in the price of the second good”.<sup>10</sup> If two goods have a high cross price elasticity of demand then they tend to be close substitutes in demand. A similar measure can be used for supply-side substitution.

Cross price elasticities can be measured through econometric techniques if there is appropriate data available. However, the results require careful interpretation. Each pair of products has two cross-price elasticities, depending on the product that has the price rise. Generally, the relevant cross-price elasticity considers the effect of an increase in price by the merging parties as it is the potential post-merger market power of these firms that is at issue. Further, even if two products have relatively low cross-price elasticity, they may still be in the same market. For example, when considering a merger between two bus companies, it might be found that a 5 percent rise in bus fares only leads to a very small percentage change in the demand for rail passenger services. But this does not mean that rail is not in the same market as bus, particularly if the small percentage change for rail involves a large absolute loss of custom from the perspective of the bus companies.

Turning to the quantitative analysis of competitive effects, the simplest form of empirical analysis is concentration measures. Once the relevant market has been discerned, the market shares of the merging parties and other market players are considered. In general, and in line with broad economic understanding, the more concentrated is a market, the lower will be the intensity of competition in that market, holding all other factors constant. This is particularly the case where market participants produce identical products or products that are close substitutes. However, concentration measures provide only very crude indicators of competitive vigour. Some highly concentrated markets are highly competitive while other markets with lower concentration levels involve less competition.

A variety of more sophisticated empirical tools have developed to analyse competitive effects. One set of approaches consider (a) the likely effect of a price rise or other reduction in service by the merged firms post-acquisition, and (b) given these effects whether the price rise or other anti-competitive change will be profitable for the merged entity. For example, critical loss analysis is a standard tool used in a two-stage analysis of competitive effects. This approach uses data about the merging firms to predict the critical ‘loss of custom’ that would make a small but significant, non-

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<sup>9</sup> (1989) 167 CLR at 177.

<sup>10</sup> J. Gans, S. King and N.G. Mankiw (2003) *Principles of Microeconomics* (2<sup>nd</sup>. Ed.) Thomson, Melbourne at p.98.

transitory increase in price unprofitable for the merged entity. Once the critical loss is established, the actual sensitivity of demand that faces the merging firms is measured, in order to determine whether or not the critical loss would actually be exceeded. If it would not be exceeded, then the anti-competitive price rise is predicted to be profitable for the merging parties post-acquisition, suggesting a substantial lessening of competition.

Both stages of this analysis depend on the availability of appropriate data. Critical loss analysis depends on data about the prices and marginal costs of the merging firms. The measurement of actual demand sensitivity involves an econometric analysis that requires appropriate data and estimation techniques.

An alternative approach to the measurement of competitive effects involves the use of a 'natural experiment'. When market structures differ between, for example, distinct states or regions, it is sometimes possible to estimate the competitive effect of a merger by comparing these regions. For example, suppose that in some cities the merging parties currently compete but in others they do not. By estimating whether or not prices are currently higher in cities without competition, analysts can directly see the likely effects of the merger. Post-acquisition direct competition will disappear in all cities and the pre-merger comparison highlights whether or not this is a concern. Of course, the estimation needs to take account of other factors that can vary between regions which might otherwise lead to spurious results.<sup>11</sup>

Finally, sophisticated merger simulation is sometimes used to estimate competitive effects. This approach involves estimating the system of demand and supply for the relevant market and determining the likely effect of the merger on key economic variables such as prices. Merger simulation is highly data intensive and requires a variety of assumptions to be made about industry structure and competition. For example, "the choice of the shape of the demand function that one is estimating can have enormous effects on the results".<sup>12</sup> Because of its complexity and sensitivity to particular assumptions, merger simulation is generally contentious and, at best, provides 'back up' input for a more complete merger analysis. "In the light of some of the technical ambiguities associated with the modelling involved, merger simulation alone should not be relied upon to assess the competition issues associated with a merger; it should be considered as a complement to existing techniques".<sup>13</sup>

In addition to the above, other quantitative techniques exist that can be used in certain circumstances, for example, where merging firms compete through markets that rely on competitive tendering or other 'bidding' processes. Further, new techniques are being developed over time. However, the techniques are only as good as the assumptions relied on, the data available and the statistical tests used.

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<sup>11</sup> D. Scheffman and M. Coleman (2002) *FTC perspectives on the use of econometric analyses in antitrust cases*, mimeo, Federal Trade Commission, Washington, November, at 8.

<sup>12</sup> D. Carlton (2003) "Using economics to improve antitrust policy", *Handler Lecture*, University of Chicago, December 9 at 8.

<sup>13</sup> Lexecon op. cit. note 6 at 28.

### ***What is good empirical analysis?***

To be of use to decision makers, empirical analysis of mergers must satisfy a range of prerequisites. The analysis must be clear and precise. It must adopt sensible statistical techniques and use appropriate data. Most importantly it must be based on assumptions that are appropriate for the matter under investigation.

Florian and Walker present four criteria for “[g]ood empirical analysis ... that provides a correct description of reality and that is accessible to the decision-making bodies”.<sup>14</sup> The criteria are that “empirical analysis presented to competition authorities be:

- based on clear economic theory which implies:
- testable propositions which are:
- intuitive and
- replicable”.<sup>15</sup>

They also note the need for relevant sensitivity analysis of econometric results, the desirability of high quality data, and the importance that empirical results are both sensible and are consistent with other evidence. If the results are inconsistent with other evidence then this inconsistency needs to be explained.

Similarly, Scheffman and Coleman set out guiding principles for econometric work presented to the FTC.

*“An econometric study useful for decision making at the FTC has the following characteristics:*

- 1. Poses an empirical economic issue that is relevant to the matter at hand;*
- 2. Utilizes an economic model that is consistent with economic theory;*
- 3. Utilizes an economic model that is consistent with the key institutional factors and the facts in the setting being modelled and generates results that can be evaluated in the context of other evidence;*
- 4. Uses data that are appropriate to the task;*
- 5. Uses statistical techniques and tests of statistical precision that are suitable given the data and the economic issues;*
- 6. Provides relevant results and interpretations that realistically take into account limitations in data;*
- 7. Generates results that stand up under various tests of “robustness”;*
- 8. If conducted by “outside” economists, the data and the details of the modelling are provided with sufficient time and explanation that FTC economists can replicate and sufficiently understand the analyses and conduct their own tests; and*
- 9. Can be sufficiently explained to and incorporated into decision-making of non-economists”.*<sup>16</sup>

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<sup>14</sup> P. Florian and M. Walker (2005) “The correct approach to the use of empirical analysis in competition policy”, *European Competition Law Review*, 320-327 at p. 321.

<sup>15</sup> Ibid.

<sup>16</sup> Scheffman and Coleman op. cit. note 11 at 3-4.

Empirical analysis is only as good as the inputs used. There are three distinct inputs used in most empirical analysis for mergers. First there is an underlying economic model. Second there are a set of assumptions, based on the particular characteristics of the matter under investigation, that need to be fed into the model to make it estimable. Third, there is the data that the analyst will use to estimate the relevant parameters of interest.

All empirical analysis is based on some economic model, albeit that this may simply be a broad relationship such as the concept that increasing concentration reduces competition. If, however, the underlying theoretical model used in the empirical analysis is neither appropriate for the matter under investigation nor well explained by the analyst, the end estimation will be of little value.

For example, simple concentration analysis using the Hirschman-Herfindahl Index (HHI), is based on an underlying economic model of Cournot quantity competition. At the other end of the spectrum in terms of sophistication, merger simulation is often based on an economic model known as Bertrand price competition. But as Carlton notes:

*“Why should the analyst assume Bertrand behaviour? This assumption, though convenient, is central to the implementation of many merger simulations. This assumption could be tested but usually is not. Yet surely the assumed vigour of competition can have dramatic effects on the outcome of any merger simulation”.*<sup>17</sup>

Different underlying economic models will lead to different empirical results. The economic model used must be appropriate for the empirical analysis to be of value. Further, it must be recognised that the merger itself may alter the nature of competition and, in this sense, a different economic model may be appropriate to consider post-merger behaviour than is appropriate for pre-merger behaviour.

Both the underlying economic model and the empirical techniques used in the analysis will need to be chosen, modified and interpreted to correspond to the particular matter under investigation. As such, the analyst will need to make a variety of assumptions and these assumptions must be based on the relevant facts. As Scheffman and Coleman note, “[e]conometric analyses do not ‘come from out of the air’. Rather such analyses are typically based on important assumptions. Those assumptions typically should be based on the totality of the evidence in the case”.<sup>18</sup> Similarly, “[h]aving an economist develop an econometric analysis without sufficient understanding of the key institutional factors and facts will generally not be very useful”.<sup>19</sup>

The quality and nature of the data used in quantitative analysis is a key determinant of the usefulness of the results. The analyst must use data that is appropriate to the matter at hand. “Economists should understand any potential limitations of the data

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<sup>17</sup> Carlton op. cit. note 12 at 9.

<sup>18</sup> Scheffman and Coleman op. cit. note 11 at 2.

<sup>19</sup> Scheffman and Coleman op. cit. note 11 at 4.

and how those limitations may impact the results. No data is perfect”.<sup>20</sup> Thus, where data limitations exist these must be recognised by the analyst. This does not mean that the analysis cannot proceed due to inadequate data. Rather it means that the analyst must note the limitations of the data, where relevant modify the empirical approach to take account of these data limitations and, when reporting results, note how these results are affected by the data. For example, an analyst may only have aggregate data available, say, covering all of Australia. If a merger only involves a narrower region then the analyst can still use the aggregate data but he or she needs to recognise how the results are affected. For example, the analyst will need to consider reasons why the region under investigation might or might not be similar to other regions and, as such, why aggregate data might be more or less insightful.

Data will often be ‘cleaned up’ prior to empirical analysis. This does not mean that there is any impropriety but the approach used by the analyst must be clear to the ACCC or the court. “To make an econometric analysis understandable and reproducible, it is necessary to disclose the full details and back-up. This includes the raw data, the data actually used in the regressions, all details of transforming the former into the latter, full regression specifications, and a detailed description of the estimation techniques”.<sup>21</sup>

As already noted, an analyst will often face a choice of alternative empirical tests and these choices must reflect the facts and circumstances of the matter under investigation. At the same time, these choices will impinge on the empirical results and these results must be checked for robustness. “The economist should understand and explain how standard robustness tests impact the results”.<sup>22</sup>

Robustness involves two separate features. First, all empirical estimates are subject to error. They are necessarily imprecise. Empirical analysis must include appropriate statistical tests to determine the precision and sensitivity of estimates. For example, suppose that an econometric test of cross price elasticity of demand between two products provides a point estimate of 2. In other words, a 1 percent rise in the price of one product will lead to approximately a 2 percent rise in demand for the other product. Further suppose that, given the facts of the matter, such cross price elasticity is strong evidence that the two products are in the same market. Before concluding that the two products are indeed in the same market it is important to know the precision of the point estimate. If it is precise, for example lying between 1.5 and 2.5 with 90 percent probability, then the authorities can place strong faith in the estimate and the market conclusion. In contrast if it is imprecise, for example lying between -1 and 5 with 90 percent probability, then the point estimate is of less value. The precision will necessarily feed into the weight that is placed on the empirical estimate.

In summary, empirical estimates that are not accompanied by appropriate tests of precision and sensitivity are of little if any value to decision makers.

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<sup>20</sup> Scheffman and Coleman op. cit. note 11 at 5.

<sup>21</sup> Werden, op. cit. note 1 at 56.

<sup>22</sup> Scheffman and Coleman op. cit. note 11 at 6.

Second, robustness relates to the choices made by the analyst. Even if the analyst has made appropriate choices at each stage of the investigation, such choices are rarely clear cut and simple. If, however, the results of the analysis depend critically on a particular choice, then this needs to be noted and the alternative pointed out to the authorities. To continue with the above example, suppose that the point estimate of 2 is precise but that the analyst made a key choice between two alternative techniques. The analyst needs to revisit this choice before presenting the analysis to the authorities. If the alternative choice would have led to a similar point estimate then the estimate is robust to the modelling choice. If in contrast the alternative approach would lead to a significantly different point estimate, for example a cross price elasticity of only 0.5, then this suggests that the result may be less robust. This does not mean that the estimate should be dismissed. The analyst may have had appropriate reasons for making the particular choice of technique and this might be the best technique for the matter at hand. Again, however, it may feed into the weight that the authorities place on the empirical estimate.

In summary, empirical estimates that are not accompanied by appropriate tests of robustness to the modelling assumptions made by the analyst will be of little if any value to the decision makers.

Finally, the presentation of the results from empirical analysis is important. Results should be carefully presented and not over sold. “Ignoring deficiencies or overclaiming results is not helpful. ... [N]o single econometric analysis is generally conclusive. Results properly derived and qualified can be quite useful, particularly when they are integrated into the larger body of evidence in the case”.<sup>23</sup>

Analysts need to recognise that their report needs to be accessible to both economists and non-economists alike. While experts, such as empirical analysts within the ACCC or experts appointed by the ACCC, will have a clear interest in the empirical investigation and a key role in checking its veracity, mergers must be evaluated against the Act. This means that both the nature of the empirical results and their significance needs to be accessible to lawyers, industry experts and others that are involved in the merger process.

### ***Guidelines for empirical analysis in Australian mergers***

In Australia, expert evidence provided in trade practices matters is governed by the *Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia*. These guidelines note that criticism of partiality can be avoided by the expert if their report:

- (a) is clearly expressed and not argumentative in tone;
- (b) is centrally concerned to express an opinion, upon a clearly defined question or questions, based on the expert’s specialised knowledge;
- (c) identifies with precision the factual premises upon which the opinion is based;
- (d) explains the process of reasoning by which the expert reached the opinion expressed in the report;

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<sup>23</sup> Scheffman and Coleman op. cit. note 11 at 6.

- (e) is confined to the area or areas of the expert's specialised knowledge; and
- (f) identifies any pre-existing relationship between the author of the report, or his or her firm, company, etc, and the party to the litigation.<sup>24</sup>

The guidelines also set out various matters that should be dealt with in the expert report such as the expert's qualifications; the literature or other material relied on by the expert in their report; the assumptions of fact made by the expert and used in their report; and the reasons for each opinion expressed in the report. The expert must also declare that he or she has "made all the inquiries which [the expert] believes are desirable and appropriate and that no matters of significance which [the expert] regards as relevant have, to [the experts] knowledge, been withheld from the Court".<sup>25</sup>

These requirements provide a starting point for expert reports and submissions to the ACCC. However, quantitative analysis for trade practices matters, such as mergers, needs to meet more stringent criteria. In particular it must satisfy the requirements relating to inputs (modelling, assumptions and data), robustness and reporting discussed above. As a guide, if an expert report to the ACCC provides empirical analysis such as statistical analysis, econometric analysis or quantitative merger modelling then the expert should:

- (a) State clearly and precisely the exact question or questions that will be addressed by the analysis and why the analysis is an appropriate methodology to address these questions.
- (b) Provide a complete specification of the theoretical economic model that underpins the analysis, including a complete statement of the assumptions used in this model and the specific facts relied on by the expert when preparing the theoretical economic model.
- (c) Fully specify the relationship between the quantitative tests used by the expert and the underlying theoretical economic model, including any assumptions about data (for example, that the data is drawn from a normal distribution) used in the quantitative analysis and the facts relied on by the expert to justify these assumptions.
- (d) Provide the Commission with the complete data set used in the quantitative analysis including a statement of the precise source of the data. The expert should clearly state any limitations on the data that they are aware of, how those limitations have been addressed in the quantitative analysis and how those limitations may impact on the quantitative results provided by the expert.
- (e) Where the data set used in the quantitative analysis has been censored or otherwise altered by either the expert or other parties in any way (for example by removing 'outlying' data points) the entire data set including any censored or otherwise altered data should be provided to the

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<sup>24</sup> Federal Court of Australia (2004) *Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia*, 19 March.

<sup>25</sup> Ibid.

Commission together with a statement from the expert stating why the censoring or other alterations are appropriate. The report must include a declaration by the expert stating that, to the best of their knowledge, all relevant data has been provided to the Commission.

- (f) Clearly and precisely state the statistical techniques and tests of statistical precision that have been used in the analysis, including a statement as to why these techniques and tests are appropriate given the data and the economic issues addressed by the expert. Where alternative statistical techniques and tests of statistical precision are available, the expert should clearly explain why the alternative tests were not chosen. Please note that appropriate tests of statistical precision should accompany *all* empirical estimates provided in the expert report and that failure to provide such tests for *any* estimates may result in the Commission placing little weight on the entire analysis.
- (g) Provide a clear statement of the results of the quantitative analysis. Where the expert has interpreted the results, the expert must make such interpretations clear to the Commission, including a complete statement of any assumptions made in the interpretation and the facts relied on by the expert in making the interpretations. Any deficiencies or limitations in the results or the interpretation of the results should be clearly specified and fully explained.
- (h) Provide appropriate tests of robustness for all results provided in the expert report. For example, the expert should provide the Commission with tests for the sensitivity of results to model specification and to the sample of the data used. The expert should also provide the Commission with sensitivity tests addressing the institutional features and other factual issues assumed by the expert in the analysis.

Empirical analysis presented to the ACCC should satisfy the same standards demanded by peer-refereed academic journals. In particular, the analysis must be replicable by the ACCC, and the analyst needs to provide the ACCC with both the data and the details that make such replication possible. Understandably, the authorities will be able to place little weight on empirical analysis that cannot be rigorously tested and replicated.

Because empirical analysis needs to be vigorously and rigorously tested, the parties providing the analysis must make sure that time is available to the authorities for this testing. As Scheffman and Coleman note, providing inadequate time “is the most common failing” of parties presenting empirical merger analysis to the FTC.<sup>26</sup> “Submitting an economics white paper with only a short time for review and reaction is almost always counterproductive. Empirical analyses take time to conduct and they also take time to assess”.<sup>27</sup> The ACCC will similarly need time to appropriately assess any empirical work presented to it and a failure to provide such work, including the necessary supporting material, in a timely fashion may mean that the Commission can only place reduced weight on that work.

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<sup>26</sup> Op. cit. note 11 At 6.

<sup>27</sup> Ibid.

### ***Conclusion***

Empirical analysis can provide a valuable input for merger evaluation. In particular, it can help to clarify issues, particularly relating to market definition and competitive effects. While empirical analysis will rarely be definitive in its own right, it can help to support market inquiries and to assist the authorities in reaching an appropriate conclusion.

It must be recognised, however, that empirical analysis is only useful if it satisfies certain high standards. This paper has provided a guide to these standards. In particular, this paper has presented and explained a set of criteria that should be used to guide parties providing empirical analysis to relevant decision makers, such as the ACCC, in Australia.

The guiding principles presented in this paper are not unique to Australia. Indeed, the principles are developed from international experience and the approaches that have been adopted by experts and authorities overseas. In many ways the principles mirror the standards that are required for academic empirical research. While these standards are high they are appropriate if the authorities are to make important legal decisions on the basis of empirical analysis.